Euro-Crisis and Spillover Effects on the Emerging Economies

Hamidreza Tabarraei

PARIS SCHOOL OF ECONOMICS
ECOLE D'ECONOMIE DE PARIS

WORKING PAPER N° 2014 – 07

Euro-Crisis and Spillover Effects on the Emerging Economies

Hamidreza Tabarraei

JEL Codes: H63, F34, G15

Keywords: Sovereign risk, Contagion, euro crisis, emerging economies

PARIS-JOURDAN SCIENCES ECONOMIQUES
48, BD JOURDAN – E.N.S. – 75014 PARIS
TÉL. : 33(0) 1 43 13 63 00 – FAX : 33 (0) 1 43 13 63 10
www.pse.ens.fr

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE – ECOLE DES HAUTES ETUDES EN SCIENCES SOCIALES
ÉCOLE DES PONTS PARISTECH – ECOLE NORMALE SUPÉRIEURE – INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQU

Euro-Crisis and Spillover Effects on the Emerging Economies

Hamidreza Tabarraei *

Paris School of Ecnomics

October 2013

Abstract

I present some evidence showing that the advanced economies' banks were contributing in spreading the Euro-crisis to the emerging economies. For this purpose, I test the common lender channel among other channels of contagion, by using international banking flows data. Based on a constructed crisis-index for the Euro area, I find that countries with higher level of exposure to GIIPS, deleveraged more in riskier periods, i.e. during periods with high crisis-index. Among all emerging economies in our sample, the Latin American countries were not affected as much as the emerging economies Asia and Europe, despite their high exposures to Spain. While the impact of the Euro-crisis stopped to show sign in Asia after 2011, it continued to affect the emerging Europe. The Euro-area banks were deleveraging more in the Emerging Europe than their peers in non-Euro advanced economies, whereas most of their deleveraging in Asia happened in 2010. Although the results present evidence in favour of local impacts of the Euro-crisis, they show the importance of spillover through multinational banks.

Keywords: Sovereign risk, Contagion, euro crisis, emerging economies
JEL Classification: H63, F34, G15

*Paris School of Economics, Paris. Email: tabarraei@pse.ens.fr, tel: +352 661481633.

1 Introduction

Without having completely recovered from the US subprime crisis, the world has plunged into a new crisis, coming this time from the old continent. The global effect of the Euro crisis has not been as pervasive as the US crisis. However, markets set alarm bells for Italy and Spain since the beginning of the crisis. Financial markets follow carefully the situation in Italy with its huge debt and keep an eye on Spain with its wrecked financial system and weak economy. In order to fight the crisis, many governments had to pursue unprecedented austerity measures. Nevertheless, the crisis intensified in the second quarter of 2011 and the ECB was required to intervene in many fronts such as unlimited bond buys and offering cheap loans to banks called Long-Term Refinancing Operations (LTRO).

The consequences of the Euro crisis reached far beyond the boundaries of the Eurozone. Although the spillover effect, overall, was not as severe as the subprime crisis, the global banking system showed vulnerabilities stemming from their exposures to their European counterpart banks. Some of the emerging economies such as the eastern Europeans are specially more insecure because of their high exposure to their western counterparts.

This paper tries to draw a picture of international banking lending during the Euro crisis. The main goal is to discover the role of common bank lenders in propagating the Eurozone crisis to other regions in the world. More precisely, we test whether banks with higher exposure to Greece, Ireland, Italy, Portugal and Spain (GIIPS) were deleveraging more in emerging economies during the Euro-crisis. One issue that may arise here, is to disentangle deleveraging due to the global crisis from deleveraging due to the Euro-crisis. For this purpose, I use a difference-in-difference approach by serving non-Euro area banks as the control group. The hypothesis is that, during the global crisis all banks were affected whereas during the Euro-crisis, banks in the Euro-area were more involved. Another problem is that we should isolate the loan demand shock from loan supply shock in our identification strategy. For this issue, joint fixed-effect (lender-borrower) are used to control for non-time variant components of lender/borrower bilateral relationship. Besides, I assume that unlike the global crisis that affected the whole world to some degrees, the Euro-crisis was contained inside the Eurozone mainly. Moreover, it is assumed that emerging countries have access to different sources for

the same type of funding and therefore any demand driven shocks should not affect the identification of the supply channel.

While a number of authors examine spillover effects of the Euro-crisis on emerging markets, the use of banking flows and common lender channel is new. I first look at the usual factors, cited in the literature, on international banking flows. The results reveal that, many macroeconomic variables as forces responsible for international flows were not anymore the main factors behind the variations of flows after the subprime crisis. Contrary to Latin America, common lender channel exists in the Asian and the emerging European countries during all the years following the global crisis. However, the common lender channel stopped showing signs for Asia in 2012 while the emerging Europe continued to be affected.

Furthermore, when the lender countries into Euro area and non-Euro area lenders, we observe a general deleveraging in emerging economies in 2008 and 2009 whereas Eurozone lenders continued to deleverage through 2010 and 2011. In Asia, the Euro area banks deleveraged more than their non-Euro area peers in 2010 while in the emerging Europe, the deleveraging by the Euro area banks were more pronounced.

During the last 25 years, many studies offered some explanations to clarify different mechanisms in international transmission of shocks. Before the Asian crisis, many studies had focused on direct links such as trade and FDI. This is called the income effect. More recent studies try to explain the transmission of shocks through financial channels. This strand of literature started mainly by the work of Krugman (1996) who argued that the financial turmoil can start from speculative attacks on pegged currencies when the government continues to follow its expansionary fiscal policy. More advanced versions of the this model included self-fulfilling crisis and herding behaviours.

Another class of models are based on “wake-up call” line of reasoning. In these models, a financial turmoil in one country acts as a wake-up call for international investors. Crisis shifts investors’ perceptions for other country’s financial and macroeconomic fundamentals which ultimately leads to an outflow from emerging countries. Since this type of spillover is not caused by economic fundamentals, it is often called “pure contagion” as it is suggested by Masson (1998). However, the main critic toward the self-fulfilling crisis and wake-up call is that in these models the source of the change in investor’s expectation is not specified.

"Common lender effect" which is the subject of this study, is first suggested by **?**. According to this theory, countries that are affected during a crisis are those which depend on the same lenders as countries from where the crises have originated from. This effect exists because investors experience a loss on their balance sheets and withdraw from other countries in which they hold positions. This is different from a wake-up call which is an increase in the investors' degree of risk aversion. The reasons why common lenders withdraw their funds are multiple and it can go from restoring capital adequacy ratio to meet the margin call or liquidity reasons. Many authors such as Schinasi and Smith (1999) showed that asset returns in the ground zero crisis country and the affected country are positively correlated. This suggests that different countries that share the same lenders, are vulnerable to one another's shocks.

This paper is in line with the literature on the role of international flows in international transmission of shocks. Since the seminal work of **?** in which they confirm the dominant roles of financial sector and international bank lending, many studies have been produced in order to explain different aspects and mechanisms of financial contagion. Cetorelli and Goldberg (2010) examine the international transmission of shocks on banks' balance sheet, originating from advanced economies during the subprime crisis. They isolate loan demand from loan supply shocks by using fixed effects for borrower countries which would absorb any demand driven shocks. Authors consider three types of lending: cross-border loans, local claims by foreign-owned banks, and loans by domestically-owned banks and they find the presence of supply shocks through all three channels to developing countries.

Van Rijckeghem and Weder (2003) are among the first who introduced a common lender channel explicitly in the analysis. They look at the Mexican, Asian and Russian crisis and find an active common lender channel in the Mexican and Asian crisis. Herrero and Martinez Peria (2007) also analysed the determinants of bank lending by separating local and cross-border claims and conclude that bank flows are more stable through branches and subsidiaries than cross-border lending. Thus bank filial reduce their lending less than domestic bank lending when a financial crisis occurs.

More recently, Aizenman et al. (2012) assess empirically contagion from the Eurozone countries to developing countries and emerging markets via the equity and bond markets. Based on an event study, abnormal return variations in the stock and bond markets in emerging

economies against the Eurozone news is used as a proxy for contagion effects. While authors confirm a contagion from advanced economies to developing countries during the global depression, they find a mixed picture on the existence and magnitude of contagion from the Eurozone countries to emerging economies.

Another strand of literature have focused on the external and internal factors of international capital flows. For example, Fiess (2003) used principal component analysis in order to disentangle global factors of international capital flow from country-specific factors. These factors are then used as explanatory variables to explain capital inflows in Argentina, Brazil, Mexico and Venezuela. The author finds strong evidence that country specific (pull) factors are important in the pattern of observed capital flows. However, global (push) factors are only important in Brazil, Mexico and Venezuela. Overall, the persistence and pattern of the impact of these factors vary across time and countries.

In the line with pull and push factors, Ghosh et al. (2012) use some additional variables for bilateral factors and control for financial interconnectedness between lenders and borrowers. Surprisingly, they find that the emerging Europe to be a more stable region after the global financial crisis. This is because, concentration of investors' portfolios in EU10 or EU candidate borrower country is not a disincentive for lending. This results does not hold for other regions in the exercise. The results of this paper accord with the result of Hermann and Mihaljek (2010) in which a gravity model is used to explain international capital flows from advanced to emerging economies. The authors deduce that the reduction in capital flows to emerging Europe was limited during the global recession of 2007-2008. Portes and Rey (2005) also use a gravity model to explain international transaction in equity flows. They deduce that information frictions play an important role in determining the pattern of cross-border transactions. Moreover, Papaioannou (2009) shows the relationship between institution quality and banking flows.

Banks are responsible for international transmission of shocks through many channels. In general, banks rely on different sources of funds such as local deposits as well as external funds coming from other countries. They can also rely on internal funds financed by subsidiaries and branches. In order to explain the mechanism through which banks transfer shocks internationally, assume a global bank with foreign affiliate subsidiaries and branches. Divided into two

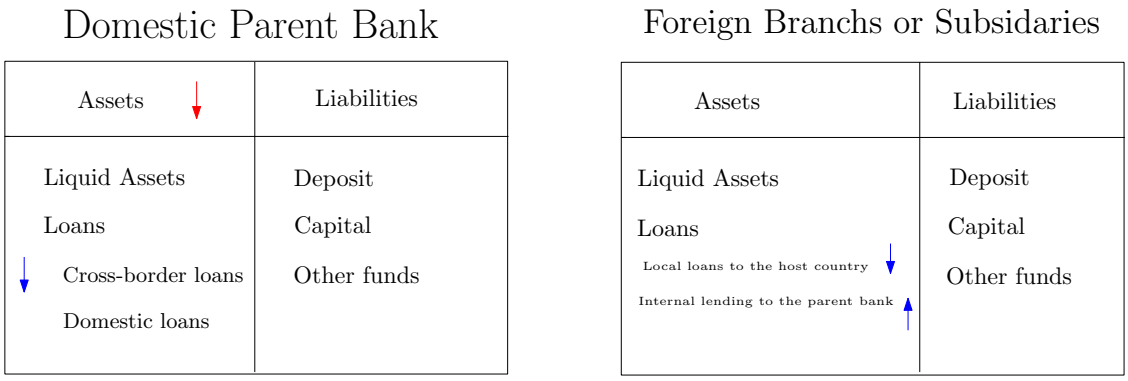


Figure 1: The red arrows shows the initial shock to the balance sheet and blue arrows show the subsequent reactions. The parent bank decreases its cross-border loans and it asks for internal lending from its branches and subsidiaries. Consequently, foreign affiliate banks also reduce the volume of their local loans.

parts for the parent bank and the foreign affiliated bank, the balance sheet of such a global bank is shown in figure 1. The parent bank holds some liquid assets and loans in the asset side and it holds deposit, capital and other types of funding in the liability side. The balance sheet of the foreign affiliated bank is similar to the parent bank. The main difference between the two balance sheets lies in the asset side and in the composition of the loans.

When the domestic bank realises a loss on its assets, three channels activate which result in a reduction of available fund for loans in the foreign country. First, due to the loss, domestic bank reduces its direct cross-border exposure or loan supply, second it decreases the amount of available fund in the cross-border interbank market and third, its foreign affiliates decrease their lending in the host country. These channels activate if the parent bank cannot raise fund through other sources. In the case of the Euro crisis, this highlights the role of the ECB and its plan to recapitalize banks by LTRO. Also as Sbracia and Zaghini (2003) confirmed, a common lender channel most likely activates, when the ground-zero crisis country is an important borrower of a specific lender. Besides aforementioned channels, portfolio flows is another important financial channel for emerging countries. If the crisis lead to a credit crunch, foreign capital flows will repatriate from emerging countries and challenge the sustainability of the current account deficit. A drying-up of foreign bank credit would also put downward pressure on the currencies of countries that rely on foreign capital. This is because they may need to cut interest rates to stimulate their economies. Moreover, currency depreciation poses serious

risk for portfolio inflows which are very important for the emerging economies. Weakening currencies translates into losses on such investment which could slow down or even reverse portfolio inflows. Also, notice that banks through their off-balance sheet items can have higher exposures to the crisis country which is often not captured in the data.

In the next section, I present some stylized facts on international capital flows related to the Euro crisis. In section 3 the methodology and data are discussed in detail and then I present the results in 4 and finally I conclude.

2 Some facts

During the past decade, the aggregate cross-border claims in the Asia, emerging Europe and Latin America has been tripled. This shows the importance of banking flows in transferring risks across countries. In the second quarter of 2008, the exposure of 9 major Eurozone countries to developing economies reached to more than 2.45 trillion dollars. Only after 6 months, banks reduced 15% of their exposure. With the Euro-crisis going on, western European banks again reduced their exposure to developing economies by a magnitude of 12% during the second half of 2011. Although international banking flows plunged sharply after the global crisis in 2008, they have reached and surpassed, in some regions, the pre-crisis levels.

Figure 2 shows the evolution of banking flows to developing economies in each region. The base quarter on which, flows to each region is normalized to 100 is the third quarter of 2008, just after the Lehman collapse. Figure 2a exhibits the flows for all reporting banks to each developing region. The level of international claims on developing Asia and Latin America is far beyond the the pre-crisis level, while claims are stagnated at the same level for Africa and Middle-east. Aggregate claims on the emerging Europe remains below its pre-crisis level, during all periods. Panel 2b shows the same graph for the Eurozone reporting banks. Almost the same patterns repeat for the emerging Europe and Africa and Middle East. However, the growth in flows toward Asia and Latin America is much lower than the overall growth from all reporting countries showed in panel 2a. Flows from European banks to these regions surpassed their pre-crisis levels before the peak of the Euro-crisis and they fell again until another uprising in late 2012. The fall in foreign claims of reporting banks in developing

regions between Q2 and Q4 2011 is comparable to the drop of foreign claim between Q2 and Q4 2008. Euro-area banks have deleveraged around US $1.5 trillion during the last two quarters of 2011.

These graphs suggest that emerging European countries are the most vulnerable economies to the Euro-crisis and the western European banks are at the heart of this problem. These countries are affected by many channels such as trade, interbank market, currencies and bond spreads. For developing economies close to the Eurozone, the Euro-area banks are the main lenders. If these banks are under pressure to meet better capital-ratio targets, they may choose to cut lending rather than raising capital. Europe banks' were owed $3.4 trillion by emerging economies in our sample of which $1.3 trillion were lent to eastern Europeans in 2011.

The graphs also indicate that deleveraging has not affected all emerging markets at the same scale for many reasons. One of the reasons is that the Euro-area banks' share of domestic banking assets was very small in many emerging countries, for example around 10% in Emerging Asia. Another reason for this heterogeneity is that, depending on whether banks' business model is conducted by subsidiaries, branches or simply by cross-border flows and other characteristics of international banking flows, spillover effects vary.

As we will see, the common lender channel is almost always absent in Latin American countries despite of their high exposure to Spain. Figure 3 presents the deleveraging of all advanced economies in our sample in each region as a percentage of each lender country's total claim in emerging countries between Q2 and Q4 2011. This figure shows that most of deleveraging in this region has been done, in consolidated banking statistics, by Spanish banks. The main reason for the absence of common lender channel in Latin America is that Spanish banks operate in this region mainly though their subsidiaries which focus mainly on retail banking and their operations are funded principally through the local deposits. Nevertheless, Spanish banks cut their activities in Latin American countries where they were not viable or in non-core activities such as pension funds. The other reason is the low exposure of other advanced economies in this region.

Although, Austrian and Italian banks happen to be the main deleveraging forces in the emerging Europe, they also have a big retail business in this region. The banks in these two countries are following their business models, similar to Spanish banks in Latin Amer-

ica, through their subsidiaries and via local currency funding. German and Dutch banks also deleveraged significantly in the emerging Europe. However, contrary to Italian and Austrian banks, overall, they downsized their presence in the Eastern European countries.

In Asia, French, Swiss and Dutch banks reduced their exposures because of funding pressures in the domestic parent banks. Generally speaking, Euro-area banks and on top French banks have done the most deleveraging in emerging economies. Except Swiss banks, deleveraging in non-Euro banks were limited and even Japanese banks increased their exposure during second half of 2011.

3 Methodology and Data:

I use the BIS annual dataset for the international banking flow. The data is organized in 9 advanced creditor countries: Austria, France, Germany, Italy, Spain, Switzerland, Japan, UK and US and it includes 31 emerging countries as debtors. The list of these countries can be found in table 6. The data is taken from BIS consolidated data. The consolidated data report all banks' financial claims on the rest of the world. Thereby it provides a measure for exposure risk of domestic banking system. BIS also reports "locational banking statistics" which is different from consolidated data. BIS consolidated banking statistics refer to the aggregate claims of creditor country banks and not claims by host countries. As a result, exposure of a bank through its subsidiaries and branches (in the emerging countries for our purpose) is captured as claims of the original credit bank (US lending to Malaysia through its subsidiaries in Singapore is counted as US lending). Therefore, banks can change their exposure to the host country without a one for one relationship in the balance of payment. Each set of these datasets has its own advantages. The advantage of locational banking statistic is that data are adjusted for exchange rate movements and it is compatible with balance-of-payment definition. However, from a common lender point of the view, the consolidated data seems to be a better choice because it allows us to study how a shock to a specific country banking system can affects international flows to emerging economies. Another advantage of consolidated data is that the BIS publicly publishes the aggregate consolidated data on exposure of each country against other countries and regions.

An important issue in international lending is the valuation effect. The true value of flows may not be reflected correctly because of the movement in the exchange rate or change in the asset price. Flows are underestimated with the depreciation of a country's currency which borrows in its own currency. In order to adjust data for exchange rate movements we have to make a guess on the amount of international lending which is denominated in the local currency. Assuming claims and the exchange rate at time t_0 as I_0 and E_0 and at time t_1 as I_1 and E_1 respectively, then the real inflows is equal to:

$$I_1 - \left((1-\gamma)I_0 + \gamma I_0 \frac{E_1}{E_0}\right)$$

Where γ is the fraction of claims, denominated in the local currency. In Van Rijckeghem and Weder (2003) this share is estimated to be around 20%. They chose the 20% based on the share of debt securities to total claims and share of local currency denominated bank claims.

The BIS consolidated data only covers the on-balance sheet claims whereas during the crisis the off-balance sheet data plays an important role, because banks usually use their off-balance sheet positions to hedge their positions. This is important in cases where banks have an important exposure to other financial or non-financial entities which have large exposure in the crisis country (GIIPS in the case of the Euro-crisis).

The dependent variable is the change in the external position of banks in advanced countries as a share of their total positions. Independent variables are banking exposure to a host country as a percentage of the creditor country's total claims and the common lender variable which is exposure of banks to GIIPS as a percentage of each creditor country's total claims. The rest of variables include macro and financial variables which are judged to be important in the literature of international capital flows. For macroeconomic variables, data from the International Monetary Fund's IFS database, Eurostat and IADB are used. Among other variables, I use a crisis index which is constructed as follow:

$$\text{CISS} \times \frac{\text{World Claims on GIIPS}}{\text{World Claims on Euro Area}} \times \left(1 - \frac{\Delta\text{World Claims on GIIPS}}{\text{World Claims on GIIPS}}\right) \times 100 \quad (1)$$

where CISS stands for "Composite Index of Systemic Stress" in the financial system. This

index has developed in 2012 by the ECB "*to measure the current state of instability, i.e. the current level of frictions, stresses and strains (or the absence of these) in the financial system and to condense that state of financial instability into a single statistic.*" as it is stated in Holló et al. (2012). CISS is a combination of 15 mostly market-based financial stress measures that are classified into five categories, namely the financial intermediaries sector, money markets, equity markets, bond markets and foreign exchange markets. In order to capture the idea of the systemic risk, the CISS puts more weight on situations where stress prevails in many market segments at the same time. Recently, many other Financial Stress Indexes (FSI) have been developed. We chose CISS, because the subject of this study is the Euro crisis and besides, the data are publicly available. Equation (1) adjusts CISS for the world deleveraging in GIIPS. The index includes the weight of these five countries in the Eurozone and it puts more stress in situations where investors from all over the world withdraw their funds from GIIPS.

Figure 4 shows the crisis index since the year 2000 in quarterly time frequency. The index captures well the events before and after the global crisis. It reaches its maximum in 2008-Q4 and remains high during 2009. It increases again in the first quarter of 2010 with the beginning of the Euro-crisis. The index shows that the hardest periods, during the Euro-crisis were between the second and fourth quarter of 2011.

Figure 6 traces the growth rate of exposure of all countries in panel 6a and for European countries in panel 6b against the crisis index. The two graphs seems to be highly and negatively correlated. When deleveraging, i.e. the growth rate of claims reaches its minimum level, the crisis-index reaches its maximum as well. While the deleveraging for all countries is comparable with European banks' deleveraging, during the second half of 2011 European banks deleveraged more than other reporting banks in the sample.

On the other hand, figure 5 exhibits the average exposure growth rate of each advanced economy in emerging countries versus their exposure to GIIPS, as a percentage of their total exposure, during 2011-Q3. It appears that advanced countries with relatively higher exposure to GIIPS, on average deleveraged more in emerging economies. Figures 6 nad 5 motivate the use of crisis index and exposure to GIIPS as independent variables and explaining the change in exposure to emerging economies.

4 Results

4.1 Base specification

In this section, I present and discuss the main results. In the literature of international banking flows, many pull and push factors are often repeated as the main drivers. The first question that I address here is whether these main pull and push factors are still the main drivers after the subprime crisis? In order to do so, I run regressions of the form:

$$\frac{\Delta\text{Exposure}_{ijt}}{\text{Exposure}_{it}} = \alpha + \beta\frac{\text{Exposure}_{ijt}}{\text{Exposure}_{it}} + \zeta\frac{\text{exposure to GIIPS}_{it}}{\text{Exposure}_{it}} + \eta\text{Crisis Index}_t + \lambda(\text{exposure to GIIPS})_{it} \times \text{Crisis Index}_t + \gamma(\text{Macro variables})_{jt} + \delta_{ij} + \varepsilon_{ijt} \quad (2)$$

where Exposure_{ijt} is the exposure of banks in advanced economy (AE) i, in each emerging country (EME) j at time t. $\Delta\text{Exposure}_{ijt}$ is the change in this variable and exposure to GIIPS is the exposure of these banks against GIIPS. δ_{ij} is the country-pair fixed effect. This variable controls for all time-invariant characteristics of each pair of countries such as geographical distance, common language, etc. A significant λ means that "common lender/flight to quality" channel is active during the crisis period. A significant and negative λ captures the effect of AE banks higher level of exposure to GIIPS during crisis periods on emerging countries.

Table 1 shows the base specification of international banking flows in our panel data. The exercise is performed for the whole sample period 1999Q4-2012Q4 and then it is repeated for two sub-periods 1999Q4-2007Q4 and 2008Q1-2012Q4. For each time period the first column includes macro variables. The sign of *exposure* in all regressions is positive meaning that change in exposure is proportional to initial exposure levels.

For example the coefficient of exposure in the first column means that for each additional percentage point of exposure, flows increase, on average, by 3.88% to that emerging country. Coefficient for *Exposure to GIIPS* is positive and significant after the year 2008 and in the whole sample period when macro variables are not included. This is contrary to our intuition, but we can interpret its sign only with the help of coefficients for *Crisis index* and the interac-

tion term which are negative when they are significant. The positive sign makes sense when there is no crisis in GIIPS countries. Here, the positive sign means that the total effect of *Exposure to GIIPS* on ΔExposure decreases across levels of *Crisis index*. In other words, having additional exposure of one percentage point to GIIPS countries in an environment with higher crisis level has relatively smaller effect on reducing bank exposures in emerging economies. In the other dimension, the coefficient of *Crisis index* is negative and also significant. This implies that the total effect of crisis level increases across levels of *exposure to GIIPS*. This means that in high levels of exposure to GIIPS, higher crisis level has bigger negative effect on the change in exposure.

Among macro variables, *real effective exchange rate* (REER) and *Export growth rate* are significant with expected signs after 2008 and for the whole sample. REER is a useful variable since it takes into account, not only inflation and exchange rate movements, but also, it includes exchange rate regime and trade competitiveness. In a flexible exchange rate regime, real appreciation of REER is due to an appreciation of nominal exchange rate and in a fixed regime, it translates into a rise in inflation. Real appreciation also undermines competitiveness. In literature, the positive relationship between REER and capital inflows in emerging economies are well documented (see for example Calvo et al. (1993)). Current account balance is the main driver after proportional flows during the pre-crisis period. It is again very well-known that in the nineties, the outpouring of international capital flows from advanced economies to emerging countries coincided with the growing current account deficit in these countries (see Debelle and Galati (2007) for example). It appears that, this pattern continued in 2000s until the starting of the subprime crisis. In the regression with the whole sample, public debt also emerges with a negative sign which is expected. The R-squared is low for all regressions. However, this is normal in a panel dataset since usually variations across individuals (here country-pairs) at a given time is bigger than variations across time for a given individual.

This exercise presents some evidence in favour of common lender channel after the year 2008 for advanced countries in the sample. Next, it is interesting to analyse how this channel contributed in propagating crisis in different regions of the world. For this purpose, I divide the sample of emerging and developing economies into three regions, namely Asia, Emerging Europe and Latin America (LA). This time, I focus only on common lender variables since macro

variables could only marginally explain international capital flows into emerging economies during and after the subprime crisis.

Table 2 exhibits the results of this exercise by regions. It appears that the Latin America was not affected neither by the subprime crisis nor by the Euro-crisis. This is surprising knowing that European banks provide more than 45% of all external flows to Latin America[1]. This region is also particularly exposed to Spain and to a lesser extend to France. However the nature of the parent/subsidiary relationship seems to be more important than the overall claims by European branches and subsidiaries in the region. One explanation could be that, in Latin America, local subsidiaries of European banks act as local banks because of their sizes and they receive deposits in local currencies. Most of loans are then funded by local deposits rather than wholesale funding which is the case for the emerging Europe.

The common lender variable indicates that Asian countries are as vulnerable as the emerging Europe to the Euro-crisis. In general, Asian banks like Latin America have a large share of their liabilities made up of deposits and their reliance on wholesale funding is low. Nevertheless, Korean banks are very depending on wholesale funding and are more exposed to global market volatility. Other countries, such as Hong Kong and Singapore are financial centres and are most likely to squeeze in capital markets by European banks' withdrawal. The coefficient for *exposure* is highest for the Emerging Europe before the global crisis. This is because except few countries, western European banks control more than half of the banking system in emerging European countries. This makes them particularly vulnerable to the crisis in the west. As mentioned before, the Emerging Europe is particularly reliant on the wholesale funding .

4.2 When were common lender channels active?

Banking flows are very volatile and sensitive to overall market sentiment. This means that the pattern of flows can change direction from one quarter of year to another. While the common lender channel for the post-Lehman periods in Asia and the emerging Europe was active, it captured only an average effect during this period. Particularly, we have not distinguished between the Lehman crisis and the Euro-crisis which started in 2010. For this reason, we are interested in knowing in which years emerging countries were affected the most through the

[1]BIS locational banking statistics, 2011Q2

common lender channel. For this purpose, I replaced the *Crisis Index* by year dummies and each year-dummy is interacted with the *exposure to GIIPS*.

The results are exhibited in table 3. Again, the exercise is repeated for each region and for the whole sample of emerging countries. The base year is 2007. As it is expected (according to previous results), Latin America is not affected by the global crisis or the Euro-crisis. Besides possible explanation mentioned above, Latin America enjoyed a relatively high growth rate during these years (around 4% since 2011). Also, local institutions are gradually becoming more and more active within the region and less dependent to western fund sources. Low level of debt is another reason for which, Latin America has not been touched so much. While the region was struggling with the debt problem for more than 2 decades, Latin America has recovered and turned the boat around after the Argentina's crisis. The average debt-to-GDP of Latin America is around 40% which is much lower than the debt level of advanced economies in our sample. All these factors are promising and present some solid opportunities for western banks.

Asia and Emerging Europe were affected after the Lehman and Euro crises. For instance in 2010, every additional percentage point of exposure to GIIPS (as the total claims of lender countries) implies 0.23% of deleveraging in Asia with respect to the base year which is 2007. It seems that the global crisis and Euro crisis stopped to show their effect in 2012 in Asia whereas the process of deleveraging continued through 2012 for the Emerging Europe. The coefficients of interaction terms are all significant after the Lehman crisis for Asia and Emerging Europe. However, the magnitude of coefficients after the Euro crisis (from 2010 onwards) is bigger which points to the higher impact of common lender channel in the process of deleveraging.

4.3 Have lender countries in the Euro Area been deleveraging more? A difference-in-difference approach

The results presented until here show an active common lender channel for Asia and Emerging Europe after 2008. Nevertheless, results are the mixed for Euro area and non-Euro area lender countries. Table 4 shows the results when a Euro area dummy is included in the regression. The main question here is whether Euro-area banks have been subjected to more deleveraging

with respect to other advanced economies banks? For this purpose, the non-Euro area banks are served as the control group and we estimate the following equation:

$$\Delta\text{Exposure}_{ijt} = \alpha + \beta(\text{Exposure})_{ijt} + \zeta(\text{exposure to GIIPS})_{it} + \delta_E \mathbb{1}_{\text{Euro}} + \delta_{\text{year}} \mathbb{1}_{\text{Year}} + \delta_{E,\text{year}} \mathbb{1}_{\text{Euro}} \times \mathbb{1}_{\text{Year}} \quad (3)$$

The coefficients of interest are $\delta_{E,\text{year}}$. Here the base year is again 2007. These coefficients represent the difference between Euro area and non-Euro area banks in each year with respect to 2007, directly in percentage point.

In all sample countries, we observe a general deleveraging during 2008 and 2009, where as the process of deleveraging continued for Euro area lender countries through 2010 and 2011. For Asia this coefficient is only significant in 2010 and for the emerging Europe all coefficients are significant. For instance in Asia in 2010, the Euro-area countries' banks have reduced 3.38% more their exposure, comparing to non-Euro area banks. Emerging Europe showed more vulnerable to Euro area banks during all the post-Lehman years. This is because the main creditor of these countries were western European banks. However, the coefficient in 2010 is the biggest and the most significant.

In order to get a better image and exact date of these effects, I construct a panel whose dimensions are lender and borrower countries. By ruling out the time dimension, we get a more accurate estimation not only for the common lender channel but also of the timing of the common lender channel. Before the end of 2009, all deleveraging was related to the global crisis. Only in December 2009, the Euro-crisis gradually appeared and it did not really affect the market until May 2010. Because of this natural experiment, we put that European banks are affected more by the Euro-crisis comparing to their peers in other advanced countries. So we estimate equation 3 for two specific quarters.

First sub-table in table 5 is the result of the estimation for all countries in the sample. The coefficients of interest are again coefficients for the difference-in-difference term. The results exhibits a significant extra-deleveraging for European banks with respect to other advanced economies' banks in all tested sub-periods. For example in 2011 Q3 during the height of the Euro-crisis, European banks deleveraging on average was 5.04 percentage point more than

other AE banks during the Euro-crisis with respect to the global crisis. The common lender channel is present in sub-periods when the coefficient for *Exposure* is positive.

The second sub-table shows the result for Asia. In this region, the coefficients of interest are significant only for the first quarter of 2009. Put differently, there is no significant difference in deleveraging between Euro and non-Euro banks in 2009 Q2 and 2011 Q3-Q4. This is in contrast with the results of Emerging Europe presented in the next sub-table. Contrary to Asia, in Emerging Europe, probably most of the deleveraging related to the global crisis happened in the first quarter of 2009. Therefore in 2011 Q3 and Q4, Euro-area banks respectively had in average 3.75 and 4.44 percentage point more capital outflows comparing to non-Euro area banks with respect to the second quarter of 2009.

5 Conclusion

In this paper, I analysed the spillover effects of the Euro-crisis on emerging economies through international banking flows. I focused on the common lender channel of spillover among many other identified channels of contagion. For this purpose, the BIS consolidated data are used to capture deleveraging done by subsidiaries and branches for each advanced economy in our sample. A crisis-index based on the Composite Index of Systemic Stress (CISS) and exposure to GIIPS is also developed.

The usual pull and push factors discovered in the literature do not seem to be anymore responsible for international banking flows after the global crisis. Instead, the common lender channel, except for the Latin America was present during the post-crisis period in Asia and emerging Europe. Two main reasons could potentially explain the absence of common lender channel in Latin America: Firstly, the major foreign creditors in this region are Spanish banks. However, these banks operate principally through their subsidiaries and branches by local deposit funding. Secondly, their exposures to other advanced economies is very small.

Emerging Europe is the region which was hit the most and it has not been recovered to its pre-crisis period in terms of western banking flows. Many of main creditors of this region such as Italy, Austria and Germany have enormously deleveraged after the global crisis and during the Euro-crisis. Some of these banks, mostly in Italy and Austria changed their business model

from wholesale funding to retail banking.

Asian emerging economies were not spared from the spillover effects of the Euro-crisis either. Although the spillover effects were limited, I found that the common lender channel was present at least during the periods after the beginning of the Euro-crisis. French, Swiss, Dutch and American banks were all deleveraging during the peak of the Euro crisis while Japanese increased their exposure in the same period. In general, it is apparent that regional banks, from both emerging and advanced economies, have increased their shares in funding regional borrowers since the global crisis. This is specially true for Asia and Latin America.

In estimating banks' balance sheet shocks, we had to disentangle the effect of demand from supply shocks. Moreover, we had to distinguish between deleveraging due to the global crisis from deleveraging due to the Euro-crisis. I overcome these issues by using a difference-in-difference approach. Euro area banks have been deleveraging more during the Euro-crisis than their peers in the Japan, Switzerland, UK and US, naturally because of their higher exposure to GIIPS and sharing the same currency as the ground-zero crisis countries.

References

Aizenman, J., Jinjarak, Y., Lee, M., and Park, D. (2012). Developing countries' financial vulnerability to the euro crisis: An event study of equity and bond markets. NBER Working Papers 18028, National Bureau of Economic Research, Inc. 4

Broner, F., Gelos, G. R., and Reinhart, C. (2004). When in peril, retrench: Testing the portfolio channel of contagion. IMF Working Papers 04/131, International Monetary Fund.

Bruno, V. and Shin, H. S. (2012). Capital flows, cross-border banking and global liquidity. Ssrn working papers, SSRN.

Calvo, G. A., Leiderman, L., and Reinhart, C. M. (1993). Capital inflows and real exchange rate appreciation in latin america: The role of external factors. *IMF Staff Papers*, 40(1):108–151. 13

Cetorelli, N. and Goldberg, L. S. (2010). Global banks and international shock transmission: Evidence from the crisis. Working Paper 15974, National Bureau of Economic Research. 4

Debelle, G. and Galati, G. (2007). Current account adjustment and capital flows. *Review of International Economics*, 15(5):989–1013. 13

Feyen, E., Kibuuka, K., and Otker-Robe, I. (2012). Bank deleveraging : causes, channels, and consequences for emerging market and developing countries. Policy Research Working Paper Series 6086, The World Bank.

Fiess, N. (2003). Capital flows, country risk, and contagion. Policy Research Working Paper Series 2943, The World Bank. 5

Ghosh, S. R., Sugawara, N., and Zalduendo, J. (2012). Banking flows and financial crisis financial interconnectedness and basel iii effects. *Journal of International Commerce, Economics and Policy*, 03(01):1240001. 5

Haas, R. D. and Horen, N. V. (2012). International shock transmission after the lehman brothers collapse: Evidence from syndicated lending. *American Economic Review*, 102(3):231–37.

Hermann, S. and Mihaljek, D. (2010). The determinants of cross-border bank flows to emerging markets: new empirical evidence on the spread of financial crises. BIS Working Papers 315, Bank for International Settlements. 5

Herrero, A. G. and Martinez Peria, M. S. (2007). The mix of international banks' foreign claims: Determinants and implications. *Journal of Banking & Finance*, 31(6):1613–1631. 4

Holló, D., Kremer, M., and Duca, M. L. (2012). Ciss - a composite indicator of systemic stress in the financial system. Working Paper Series 1426, European Central Bank. 11

Kaminsky, G. L. and Reinhart, C. M. (2000). On crises, contagion, and confusion. *Journal of International Economics*, 51(1):145–168.

Krugman, P. (1996). Are currency crises self-fulfilling? In *NBER Macroeconomics Annual 1996, Volume 11*, NBER Chapters, pages 345–407. National Bureau of Economic Research, Inc. 3

Masson, P. R. (1998). Contagion-monsoonal effects, spillovers, and jumps between multiple equilibria. IMF Working Papers 98/142, International Monetary Fund. 3

Papaioannou, E. (2009). What drives international financial flows? politics, institutions and other determinants. *Journal of Development Economics*, 88(2):269–281. 5

Petersen, M. A. (2009). Estimating standard errors in finance panel data sets: Comparing approaches. *Review of Financial Studies*, 22(1):435–480.

Popov, A. and Udell, G. F. (2012). Cross-border banking, credit access, and the financial crisis. *Journal of International Economics*, 87(1):147–161.

Portes, R. and Rey, H. (2005). The determinants of cross-border equity flows. *Journal of International Economics*, 65(2):269–296. 5

Sbracia, M. and Zaghini, A. (2003). The role of the banking system in the international transmission of shocks. *The World Economy*, 26(5):727–754. 6

Schinasi, G. J. and Smith, T. T. (1999). Portfolio diversification, leverage, and financial contagion. IMF Working Papers 99/136, International Monetary Fund. 4

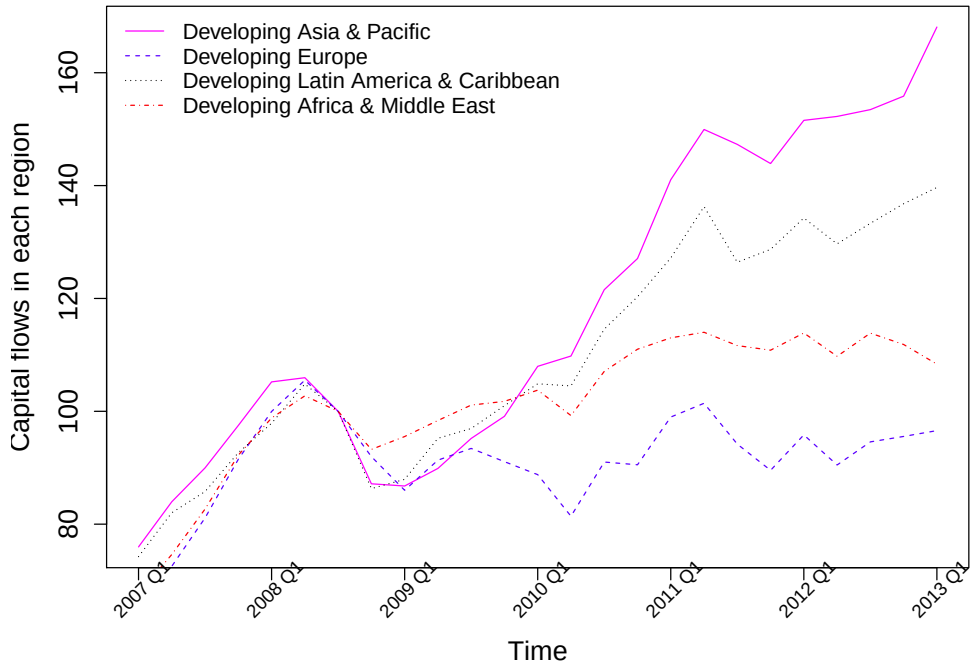
Schnabl, P. (2012). Financial globalization and the transmission of bank liquidity shocks: Evidence from an emerging market. *Journal of Finance*, 67:897–932.

Van Rijckeghem, C. and Weder, B. (2003). Spillovers through banking centers: a panel data analysis of bank flows. *Journal of International Money and Finance*, 22(4):483–509. 4, 10

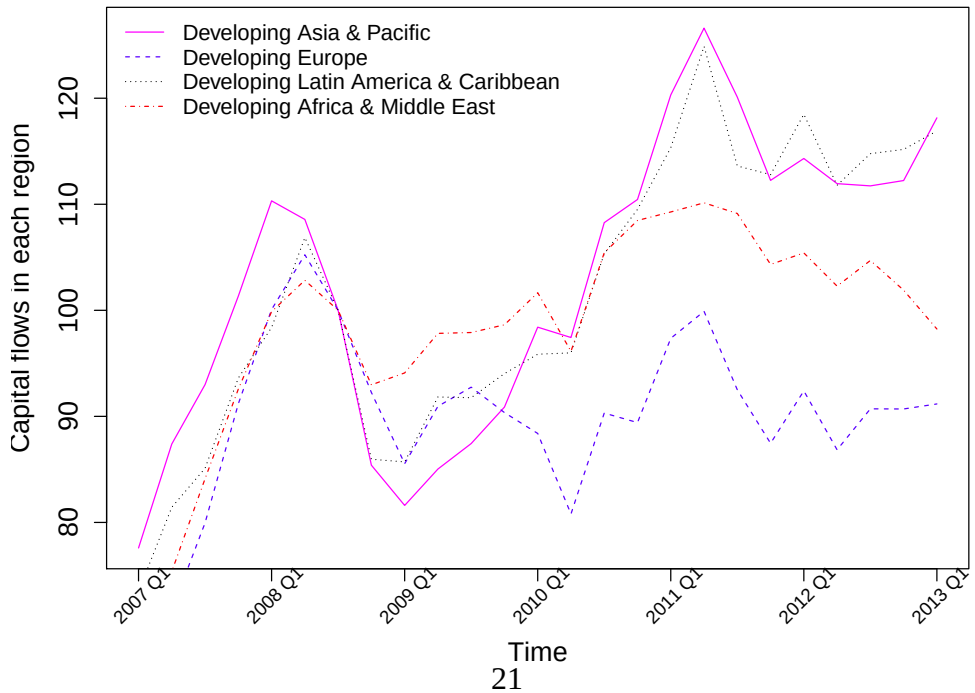
Appendix

Figure 2: Evolution of bank claims' on each developing economies. Claims are normalized to 100 in 2008-Q3.

(a) All reporting banks



(b) European reporting banks



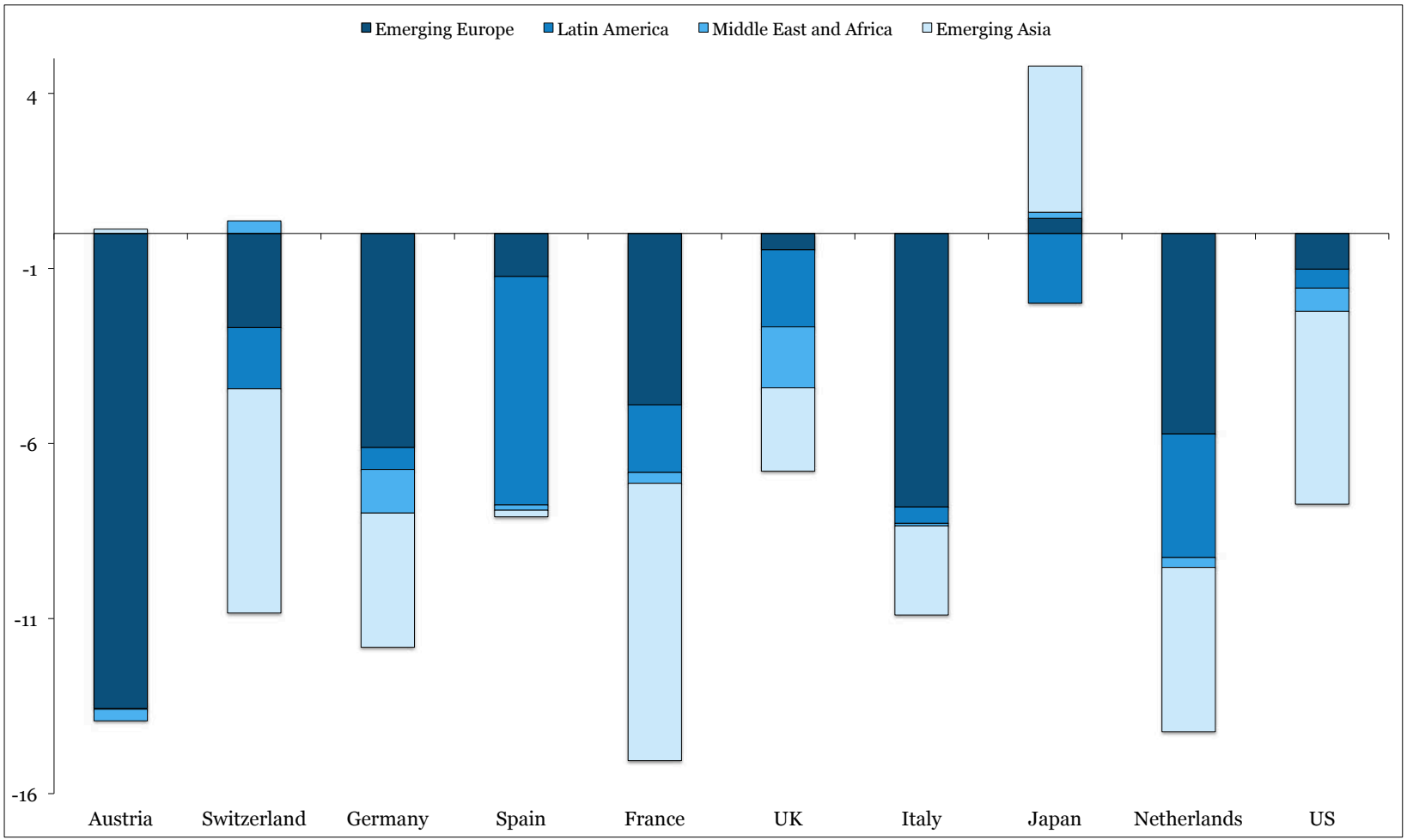


Figure 3: Deleveraging of all advanced economies in our sample in each region as a percentage of each country's total claim in emerging countries between Q2 and Q4 2011.

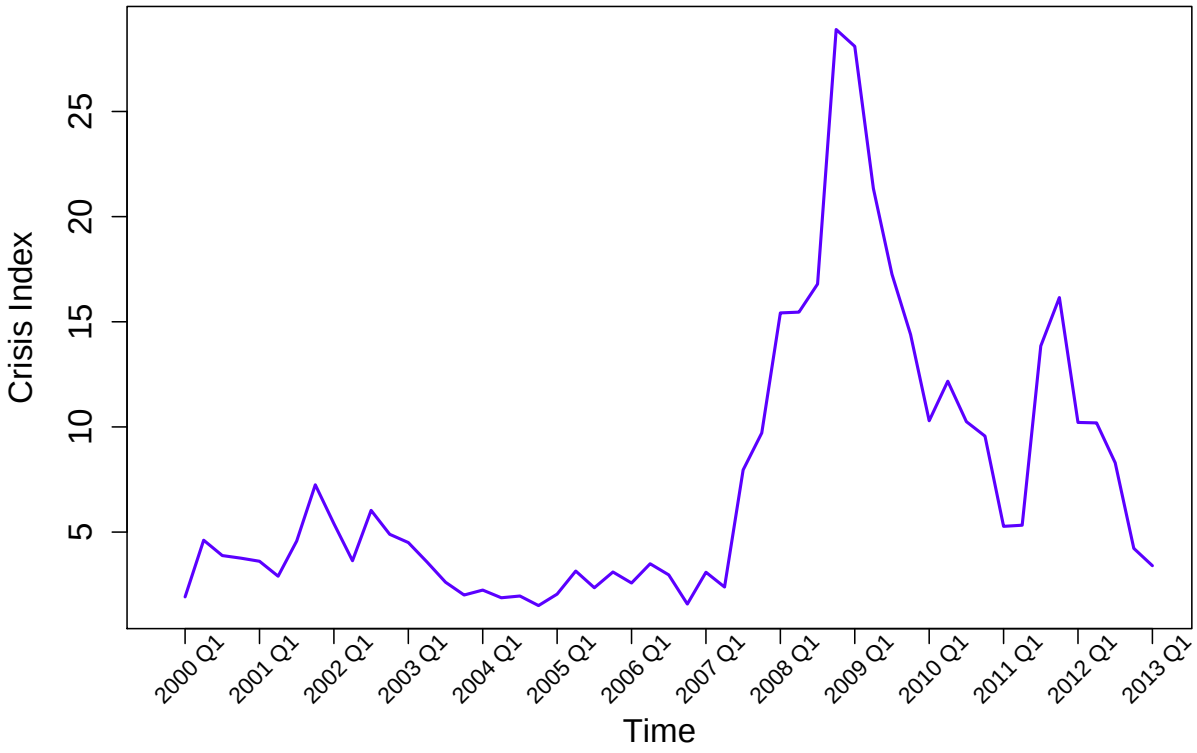


Figure 4: The figure shows the crisis index since the year 2000 in quarterly time frequency. The crisis index is constructed according to equation (1). The Composite Index of Systemic Stress (CISS), used in the construction of the crisis index, is an indicator developed by the ECB which is a combination of 15 mostly market-based financial stress measures. The crisis-index captures well the events before and after the global crisis. It reaches its maximum in 2008-Q4 and remains high during 2009. It increases again in the first quarter of 2010 with the beginning of the Euro-crisis. The index shows that the hardest periods, during the Euro-crisis were between second and fourth quarter of 2011.

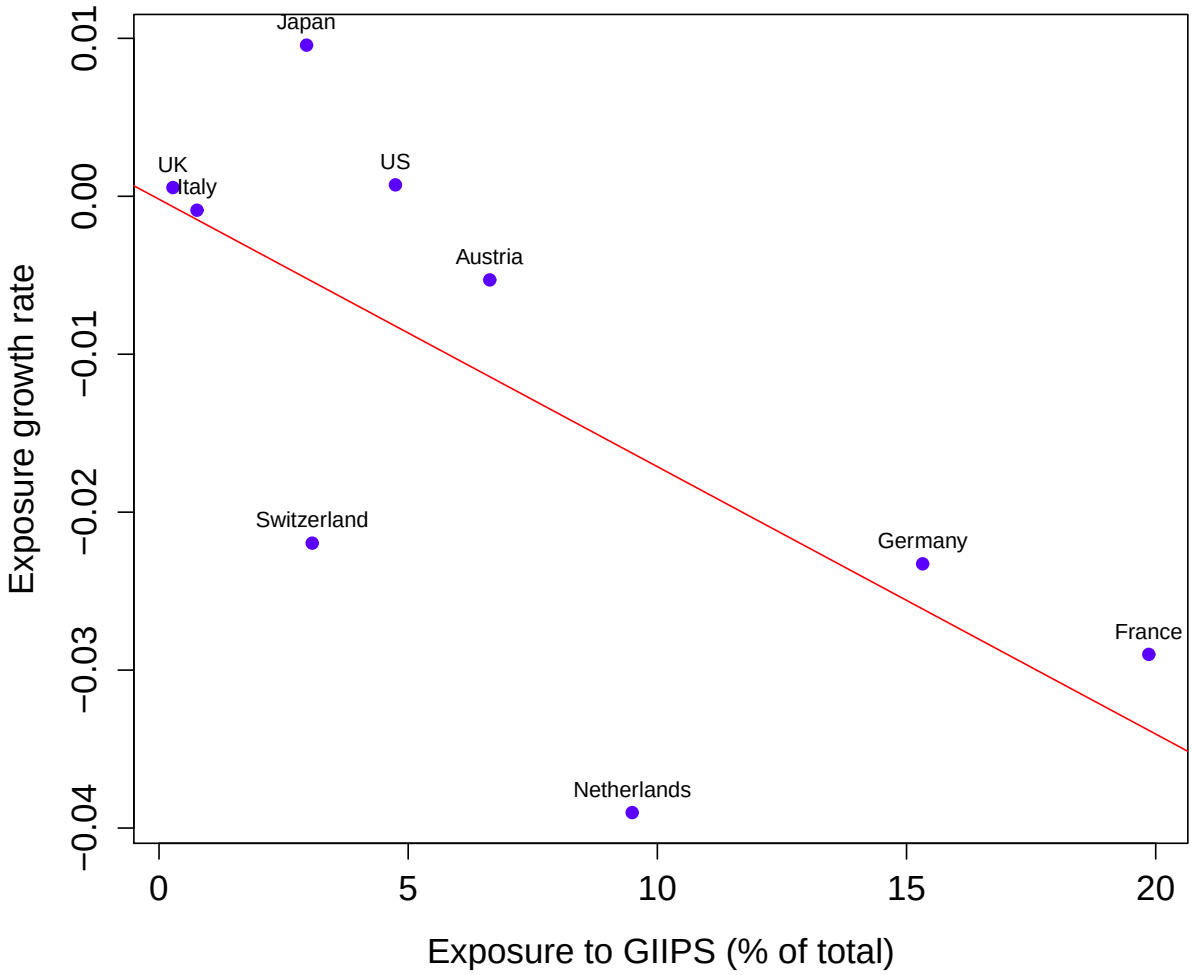
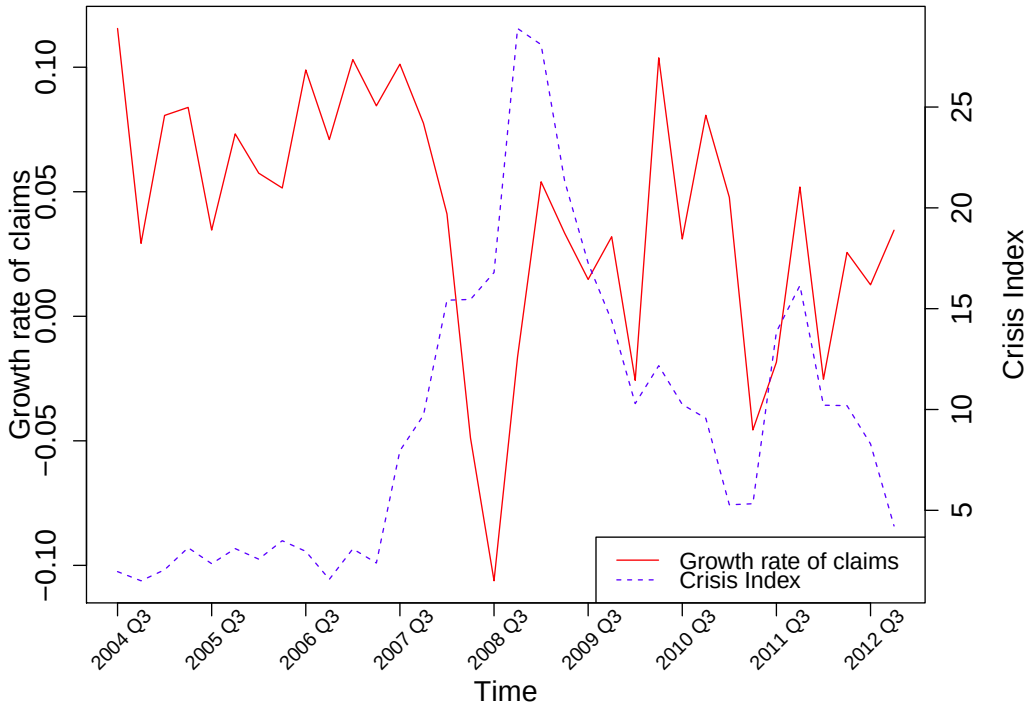


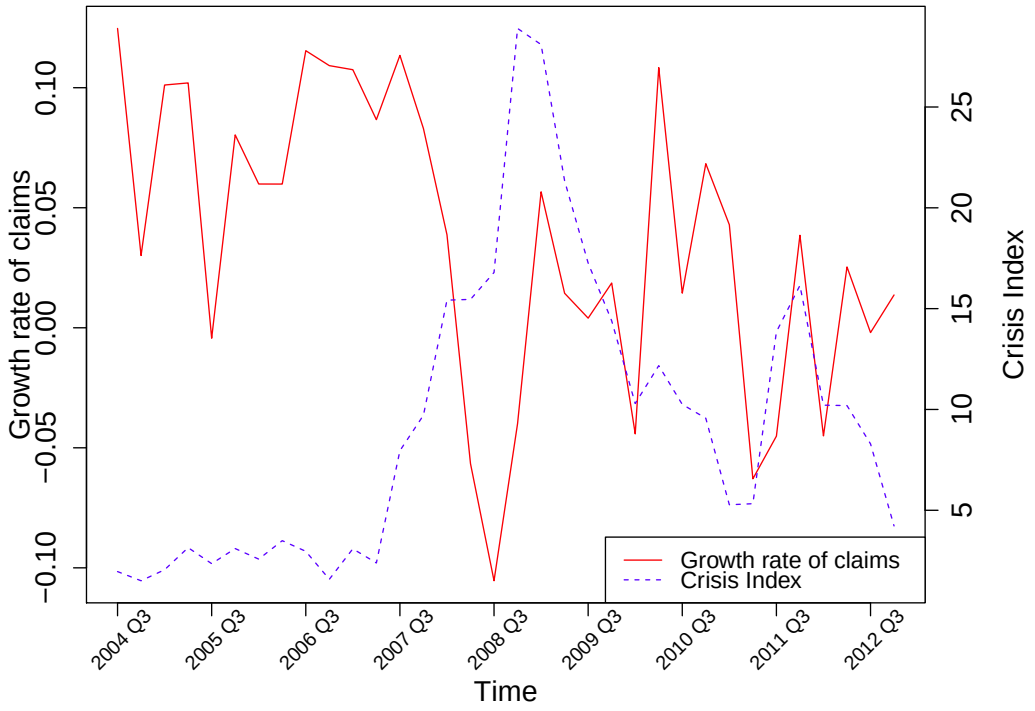
Figure 5: average exposure growth rate of each advanced economy in emerging countries versus their exposure to GIIPS, as a percentage of their total exposure, during 2011-Q3. The slope of the fitted-line is -0.0017, the intercept is -0.00018 and the R-squared is 0.396. This means that on average, for each extra percentage exposure to GIIPS, the exposure to emerging countries decreases with a rate of 0.17%

Figure 6: Growth rate of exposure to emerging economies vs the crisis-index

(a) All reporting banks



(b) European reporting banks



	1999-2012		1999-2007		2008-2012	
Variables	1	2	1	2	1	2
Exposure (% total)	0.0388^{***}	0.0509^{***}	0.1172^{***}	0.0336^{***}	0.0466^{***}	0.0461^{***}
	(0.0078)	(0.003)	(0.0125)	(0.005)	(0.0160)	(0.0087)
Exposure to GIIPS (% total)	0.0010	0.0015^{*}	-0.0000	0.0016	0.0083^{***}	0.0060^{***}
	(0.0008)	(0.0008)	(0.0010)	(0.0015)	(0.0025)	(0.0015)
Crisis index	-0.0005	-0.0004	-0.0001	-0.0009	-0.0006	-0.0015^{***}
	(0.0004)	(0.0004)	(0.0001)	(0.0020)	(0.0007)	(0.0004)
Exposure to GIIPS×Crisis Index	-0.0001^{***}	-0.0001^{*}	-0.0000	0.0000	$-1.27e-4^{**}$	-0.0001^{*}
	(0.0000)	(0.0000)	(0.0001)	(0.0002)	$(5.06e-5)$	(0.0000)
Interest rate differetials	0.0001		-0.0001		0.0006	
	(0.0001)		(0.0001)		(0.0018)	
Real effective exchange rate	0.0006^{***}		0.0001		0.0010^{*}	
	(0.0002)		(0.0002)		(0.0004)	
Current account balance (% GDP)	-0.0001		-0.0005^{**}		0.0001	
	(0.0002)		(0.0003)		(0.0004)	
Public deficit (%GDP)	-0.0002		(-0.0006)		0.0001	
	(0.0003)		(0.0004)		(0.0004)	
Public debt (% GDP)	-0.0004^{*}		0.0001		-0.0002	
	(0.0002)		0.0003		0.0005	
GDP growth rate	0.0000		-0.0000		0.0001	
	(0.0001)		0.0001		0.0002	
Export growth rate	0.0005^{**}		-0.0001		$8.13e-4^{**}$	
	(0.0002)		0.0002		$(3.94e-04)$	
Observations	14310	16960	8910	10560	5400	6400
Adj. R-Squared	0.0370	0.0237	0.0715	0.0059	0.0606	0.0154

Table 1: Robust standard errors in between parentheses. Asterisks indicate statistical significance at the 1%, 5% and 10% level by (***), (**) and (*) respectively. The dependent variable is the change in advanced economies banks' exposure to emerging countries as a percentage of their total exposure to the world. The panel unit is the joint advanced-emerging economies and joint fixed effect is applied.
The results in this table show that most of the identified macro pull and push factors in the literature are not responsible for international capital flows during and after the subprime crisis.

	1999-2012			1999-2007			2007-2012		
Variables	Asia	Europe EME	LA	Asia	Europe EME	LA	Asia	Europe EME	LA
Exposure (% total)	0.0226^{***}	0.0484^{***}	0.0529^{***}	0.0112	0.1235^{***}	0.0368^{***}	0.1577^{***}	0.0608^{***}	0.0325^{***}
	(0.0062)	(0.0047)	(0.0055)	(0.0090)	(0.0095)	(0.0113)	(0.0143)	(0.0094)	(0.0110)
Exposure to GIIPS (% total)	0.0025^{***}	0.0011^{**}	0.0002	0.0017	0.0007	-0.0024	0.0099^{***}	0.0060^{***}	0.0061^{*}
	(0.0007)	(0.0005)	(0.0027)	0.0014	(0.0007)	(0.0063)	(0.0012)	(0.0011)	(0.0034)
Crisis index	-0.0004	-0.0002	-0.0009	-0.0065^{***}	-0.0013	0.0006	-0.0015^{***}	-0.0006^{*}	-0.0014
	(0.0003)	(0.0002)	(0.0013)	0.0024	(0.0011)	(0.0106)	0.0004	(0.0003)	(0.0011)
Exposure to GIIPS$\times$Crisis Index	$-6.91e-05^{**}$	$-8.64e-05^{***}$	-1.89e-05	0.0002	-9.00e-05	-0.0012	$-1.00e-04^{***}$	$-1.11e-04^{***}$	-8.63e-05
	(2.76e-05)	(1.7973e-05)	(1.0921e-04)	0.0002	(1.08e-04)	(0.0010)	3.19e-05	(2.81e-05)	9.45e-05
Observations	5300	6360	4770	2900	3480	2610	2400	2880	2160
Adj. R-Squared	0.0124	0.0312	0.0253	0.0101	0.0666	0.0061	0.1103	0.0445	0.0113

Table 2: Robust standard errors in between parentheses. Asterisks indicate statistical significance at the 1%, 5% and 10% level by (***), (**) and (*) respectively. The dependent variable is the change in advanced economies banks' exposure to emerging countries as a percentage of their total exposure to the world. The panel unit is the joint advanced-emerging economies and joint fixed effect is applied.
The common lender channel is investigated across, Asian, European and Latin American emerging countries. The common lender variable is significant for the whole sample for Asia and Emerging Europe. The same pattern repeats for the periods after the year 2007. Before the global crisis, the channel does not act and only proportional flow (*exposure*) is significant. In other words, if we withdraw data after the subprime crisis from the whole sample, the common lender channel disappears.

Variables	All regions	Asia	EME Europe	LA
Exposure (% total)	0.0451^{***}	0.1721^{***}	0.0648^{***}	0.0326^{***}
	(0.0048)	(0.0149)	(0.0097)	(0.0110)
Exposure to GIIPS (% total)	0.0042^{**}	0.0077^{***}	0.0071^{***}	0.0001
	(0.0017)	(0.0022)	(0.0019)	(0.0063)
$\mathbb{1}_{2008}$	-0.0108	-0.0258^{***}	(0.0033)	-0.0190
	(0.0090)	(0.0098)	0.0082	(0.0281)
$\mathbb{1}_{2009}$	-0.0069	-0.0099	-0.0047	-0.0075
	(0.0090)	(0.0098)	(0.0081)	(0.0281)
$\mathbb{1}_{2010}$	0.0073	0.0061	0.0111	-0.0007
	(0.0093)	(0.0100)	(0.0083)	(0.0288)
$\mathbb{1}_{2011}$	-0.0030	-0.0070	0.0172^{**}	-0.0169
	(0.0093)	(0.0101)	(0.0083)	(0.0289)
$\mathbb{1}_{2012}$	-0.0006	-0.0159	0.0144^{*}	-0.0194
	(0.0009)	(0.0103)	0.0085	(0.0294)
Exposure to GIIPS $\times\mathbb{1}_{2008}$	-0.0017^{**}	-0.0014^{*}	-0.0024^{***}	-0.0013
	(0.0007)	(0.0008)	(0.0007)	(0.0022)
Exposure to GIIPS $\times\mathbb{1}_{2009}$	-0.0015^{**}	-0.0017^{**}	-0.0025^{***}	-0.0007
	(0.0007)	(0.0008)	(0.0007)	(0.0023)
Exposure to GIIPS $\times\mathbb{1}_{2010}$	-0.0020^{***}	-0.0023^{***}	-0.0029^{***}	-0.0010
	(0.0007)	(0.0008)	(0.0007)	(0.0023)
Exposure to GIIPS $\times\mathbb{1}_{2011}$	-0.0019^{**}	-0.0023^{***}	-0.0026^{***}	-0.0011
	(0.0008)	(0.0008)	(0.0007)	(0.0024)
Exposure to GIIPS $\times\mathbb{1}_{2012}$	-0.0006	0.0004	-0.0017^{**}	-0.0007
	(0.0009)	(0.0009)	(0.0008)	(0.0027)
Observations	7680	2400	2880	2160
Adj. R-Squared	0.0147	0.0960	0.0392	0.0080

Table 3: Robust standard errors in between parentheses. Asterisks indicate statistical significance at the 1%, 5% and 10% level by (***), (**) and (*) respectively. The dependent variable is the change in advanced economies banks' exposure to emerging countries as a percentage of their total exposure to the world. The panel unit is the joint advanced-emerging economies and joint fixed effect is applied.
The table presents common lender channel from a time perspective. Instead of using variable *crisis index*, we wanted to see the effect of global crisis and Euro-crisis separately by year dummies. The results show that the common lender channel was active in all regions except in the Latin America

Variables	All regions	Asia	EME Europe	LA
Exposure (% total)	0.0444^{***}	0.1740^{***}	0.0636^{***}	0.0330^{***}
	(0.0060)	(0.0151)	(0.0098)	(0.0110)
Exposure to GIIPS (% total)	0.0024	0.0065^{***}	0.0039^{**}	-0.0015
	(0.0017)	(0.0019)	(0.0016)	(0.0052)
$\mathbb{1}_{2008}$	-0.0185^{**}	-0.0373^{***}	-0.0113	-0.0126
	(0.0078)	(0.0082)	(0.0071)	(0.0251)
$\mathbb{1}_{2009}$	-0.0147^{*}	-0.0198^{**}	-0.0193^{***}	-0.0042
	(0.0078)	(0.0082)	(0.0071)	(0.0252)
$\mathbb{1}_{2010}$	0.0018	0.0025	-0.0017	0.0003
	(0.0083)	(0.0088)	(0.0075)	(0.0265)
$\mathbb{1}_{2011}$	-0.0052	-0.0228^{**}	0.0010	-0.0089
	(0.0085)	(0.0091)	(0.0077)	(0.0271)
$\mathbb{1}_{2012}$	-0.0051	-0.0237^{**}	0.0042	-0.0128
	(0.0088)	(0.0094)	(0.0079)	(0.0279)
$\mathbb{1}_{\text{Euro}} \times \mathbb{1}_{2008}$	-0.0167	-0.0061	-0.0165^{*}	-0.0319
	(0.0103)	(0.0109)	(0.0096)	(0.0321)
$\mathbb{1}_{\text{Euro}} \times \mathbb{1}_{2009}$	-0.0131	-0.0148	-0.0181^{*}	-0.0163
	(0.0105)	(0.0111)	(0.0097)	(0.0326)
$\mathbb{1}_{\text{Euro}} \times \mathbb{1}_{2010}$	-0.0258^{**}	-0.0338^{***}	-0.0295^{***}	-0.0198
	(0.0104)	0.0109	(0.0096)	(0.0323)
$\mathbb{1}_{\text{Euro}} \times \mathbb{1}_{2011}$	-0.0214^{**}	-0.0104	-0.0195^{**}	-0.0333
	(0.0103)	(0.0108)	(0.0097)	(0.0320)
$\mathbb{1}_{\text{Euro}} \times \mathbb{1}_{2012}$	-0.0135	0.0113	-0.0192^{*}	-0.0273
	(0.0106)	(0.0111)	(0.0100)	(0.0326)
Observations	7680	2400	2880	2160
Adj. R-Squared	0.0149	0.1010	0.0352	0.0091

Table 4: Robust standard errors in between parentheses. Asterisks indicate statistical significance at the 1%, 5% and 10% level by (***), (**) and (*) respectively. The dependent variable is the change in advanced economies banks' exposure to emerging countries as a percentage of their total exposure to the world. The panel unit is the joint advanced-emerging economies and joint fixed effect is applied. The table shows the difference-in-difference estimation with respect to the base year 2007. It appears that the European banks have deleveraged more with respect to non-Euro area banks, during all the post-crisis periods in emerging European countries, while the deleveraging in Asia mostly have been done in 2010.

Variables	2009Q1-2011Q3	2009Q1-2011Q4	2009Q2-2011Q3	2009Q2-2011Q4
Exposure (% total)	-0.0752^{***}	0.0064^{**}	-0.0352^{***}	0.0439^{***}
	(0.0042)	(0.0025)	(0.0059)	(0.0032)
Exposure to GIIPS (% total)	-0.0004	-0.0021^{***}	0.0002	-0.0015^{**}
	(0.0008)	(0.0005)	(0.0011)	(0.0006)
$\mathbb{1}_{\text{Euro}}$	0.0259^{**}	0.0240^{***}	0.0182	0.0172
	(0.0145)	(0.0090)	(0.0203)	(0.0115)
$\mathbb{1}_{2011}$	0.0149	0.0025	-0.0135	-0.0257^{**}
	(0.0129)	(0.0080)	(0.0180)	(0.0102)
$\mathbb{1}_{\text{Euro}} \times \mathbb{1}_{2011}$	-0.0421^{**}	-0.0210^{**}	-0.0504^{**}	-0.0297^{**}
	(0.0169)	(0.0104)	(0.0236)	(0.0134)
Constant	-0.0012	-0.0070	0.0170	0.0117
	(0.0098)	(0.0061)	(0.0138)	(0.0078)
Observations	640	640	640	640
Adj. R-Squared	0.3870	0.04336	0.0925	0.2981

Variables	2009Q1-2011Q3	2009Q1-2011Q4	2009Q2-2011Q3	2009Q2-2011Q4
Exposure (% total)	-0.0086	-0.0802^{***}	0.0480^{***}	-0.0189^{*}
	(0.0105)	(0.0083)	(0.0102)	(0.0109)
Exposure to GIIPS (% total)	-0.0022^{**}	-0.0010	-0.0022^{**}	-0.0010
	(0.0010)	(0.0008)	(0.0010)	(0.0010)
$\mathbb{1}_{\text{Euro}}$	0.0456^{**}	0.0263^{*}	0.0072	-0.0120
	(0.0175)	(0.0134)	(0.0172)	(0.0179)
$\mathbb{1}_{2011}$	0.0387^{**}	0.0141	-0.0367^{**}	-0.0613^{***}
	(0.0151)	(0.0115)	(0.0148)	(0.0154)
$\mathbb{1}_{\text{Euro}} \times \mathbb{1}_{2011}$	-0.0653^{***}	-0.0442^{***}	-0.0157	0.0056
	(0.0195)	(0.0149)	(0.0192)	(0.0199)
Constant	-0.0211^{*}	-0.0002	0.0244^{**}	0.0444^{***}
	(0.0118)	(0.0090)	(0.0116)	(0.0121)
Observations	200	200	200	200
Adj. R-Squared	0.07311	0.4194	0.2173	0.1897

Variables	2009Q1-2011Q3	2009Q1-2011Q4	2009Q2-2011Q3	2009Q2-2011Q4
Exposure (% total)	-0.0654^{***}	-0.0728^{***}	-0.0055	-0.0141
	(0.0117)	(0.0104)	(0.0121)	(0.0113)
Exposure to GIIPS (% total)	0.0003	-0.0008	0.0009	-0.0001
	(0.0009)	(0.0008)	(0.0009)	(0.0009)
$\mathbb{1}_{\text{Euro}}$	-0.0055	0.0067	0.0097	0.0149
	(0.0150)	(0.0135)	(0.0158)	(1.4657)
$\mathbb{1}_{2011}$	0.0043	0.0039	-0.0023	-0.0028
	(0.0131)	(0.0118)	(0.0139)	(0.0131)
$\mathbb{1}_{\text{Euro}} \times \mathbb{1}_{2011}$	0.0031	-0.0034	-0.0375^{**}	-0.0444^{**}
	(0.0177)	(0.0159)	(0.0186)	(0.0176)
Constant	-0.0049	0.0004	-0.0029	0.0025
	(0.0100)	(0.0090)	(0.0105)	(0.0100)
Observations	240	240	240	240
Adj. R-Squared	0.1433	0.2393	0.0414	0.0669

Table 5: Robust standard errors in between parentheses. Asterisks indicate statistical significance at the 1%, 5% and 10% level by (***), (**) and (*) respectively. The dependent variable is the change in advanced economies banks' exposure to emerging countries as a percentage of their total exposure to the world. The panel unit is the joint advanced-emerging economies and joint fixed effect is applied. The first sub-table shows the result for the whole emerging economies in our sample, the second sub-table is for Asian countries and the third one is for the emerging European countries. Here, we exclude the time dimension to focus on two sub-periods during which, banks where under deleveraging pressures. The result in the first sub-table states a significant extra-deleveraging for European banks with respect to other advanced economies' banks in all tested sub-periods. In the second sub-table, the coefficients of interest are only significant for the first quarter of 2009. In other words, there is no significant difference in deleveraging between Euro and non-Euro banks in 2009 Q2 and 2011 Q3-Q4. This is in contrast with the results of Emerging Europe presented in the next sub-table.

Advanced Countries	Developing Europe	Developing Latin America & Caribbean	Developing Asia & Pacific	Developing Africa & Middle East
Austria	Bulgaria	Argentina	China	Morocco
France	Croatia	Brazil	India	South Africa
Germany	Czech Republic	Chile	Indonesia	Qatar
Italy	Hungary	Colombia	Malaysia	United Arab Emirates
Japan	Poland	Ecuador	Thailand	
Netherlands	Romania	Mexico	South Korea	
Spain	Russia	Peru	Singapour	
Switzerland	Latvia	Uruguay	Vietnam	
United Kingdom	Lituenia	Venezuela	Hong Kong	
United States	Serbia			
	Ukraine			

Table 6: List of Advanced and Emerging countries in our sample